US009171305B2

(12) **United States Patent**
Michalscheck

(10) **Patent No.: US 9,171,305 B2**
(45) **Date of Patent: *Oct. 27, 2015**

(54) **PROVIDING CONFINED SPACE PERMITS AND CONFINED SPACE ACCESS PROCEDURES**

(71) Applicant: **Rockwell Automation Technologies, Inc.**, Mayfield Heights, OH (US)

(72) Inventor: **Jimi Michalscheck**, Oak Creek, WI (US)

(73) Assignee: **Rockwell Automation Technologies**, Mayfield Heights, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/271,257**

(22) Filed: **May 6, 2014**

(65) **Prior Publication Data**

US 2014/0244527 A1 Aug. 28, 2014

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/653,187, filed on Oct. 16, 2012, now Pat. No. 8,751,504.

(51) **Int. Cl.**

G06Q 30/00	(2012.01)
G06F 17/30	(2006.01)
H04W 64/00	(2009.01)

(52) **U.S. Cl.**

CPC ***G06Q 30/018*** (2013.01); ***G06F 17/30415*** (2013.01); ***H04W 64/00*** (2013.01)

(58) **Field of Classification Search**

CPC G06F 17/30575; G06F 21/6245; G06F 21/0245; G06Q 30/018; G06Q 30/0238; G06Q 50/22; G06Q 50/24; G06Q 10/06316; G06Q 30/0261; H04W 64/00; H04W 12/06; H04W 64/003; H04L 9/28; G06K 7/1456

USPC 707/740, 796, 610, E17.001, E17.064, 707/E17.046; 705/317, 14.26, 14.38, 11, 705/30, 40, 29, 14.58, 14.67, 14.66, 406; 455/445, 462.08, 465.1, 406, 410; 709/224; 702/119, 120, 121, 188, 189; 435/29, 375, 287, 487; 726/25, 4

See application file for complete search history.

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Primary Examiner — Anh Ly
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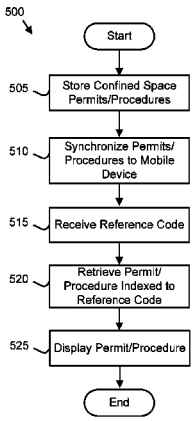
(57) **ABSTRACT**

For providing confined space access procedures and confined space permits, a synchronization module stores a plurality of confined space permits and a plurality of confined space access procedures in a confined space database. Each confined space permit and each confined space access procedure corresponds to a confined space of a plurality of confined spaces and each confined space is indexed to a space reference code. The synchronization module synchronizes the plurality of confined space permits and the plurality of confined space access procedures to a mobile device. A retrieval module receives a first space reference code at the mobile device and retrieves a first confined space permit and a first confined space access procedure indexed to the first space reference code.

17 Claims, 12 Drawing Sheets



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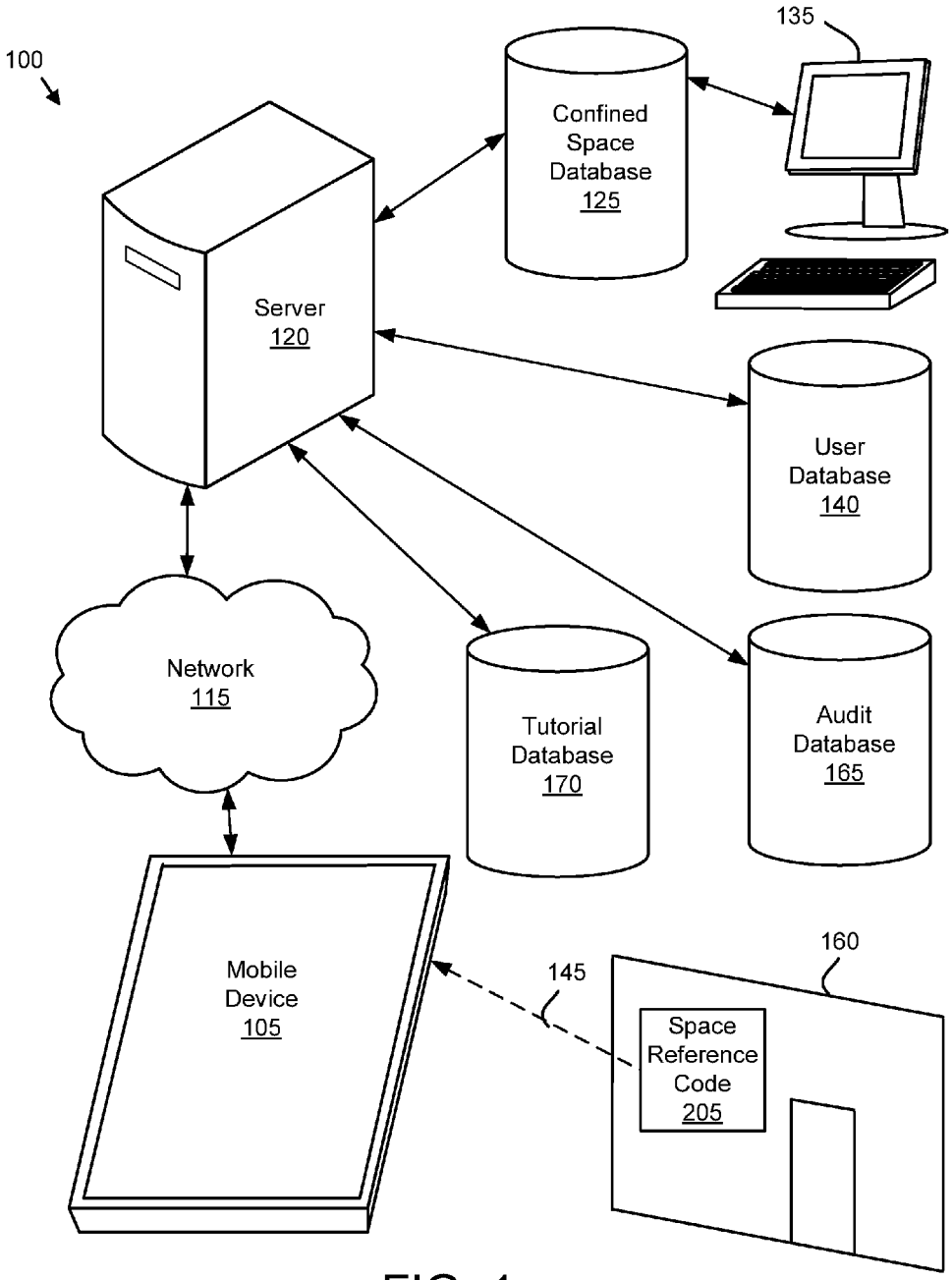
100
135
Confined Space Database 125
Server 120
User Database 140
Network 115
Tutorial Database 170
Audit Database 165
Mobile Device 105
145
160
Space Reference Code 205

FIG. 1

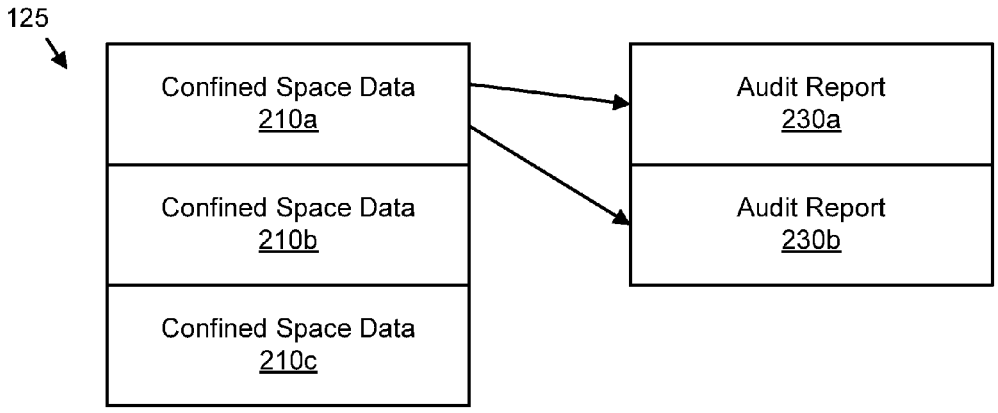
125
Confined Space Data
210a
Confined Space Data
210b
Confined Space Data
210c
Audit Report
230a
Audit Report
230b

FIG. 2A

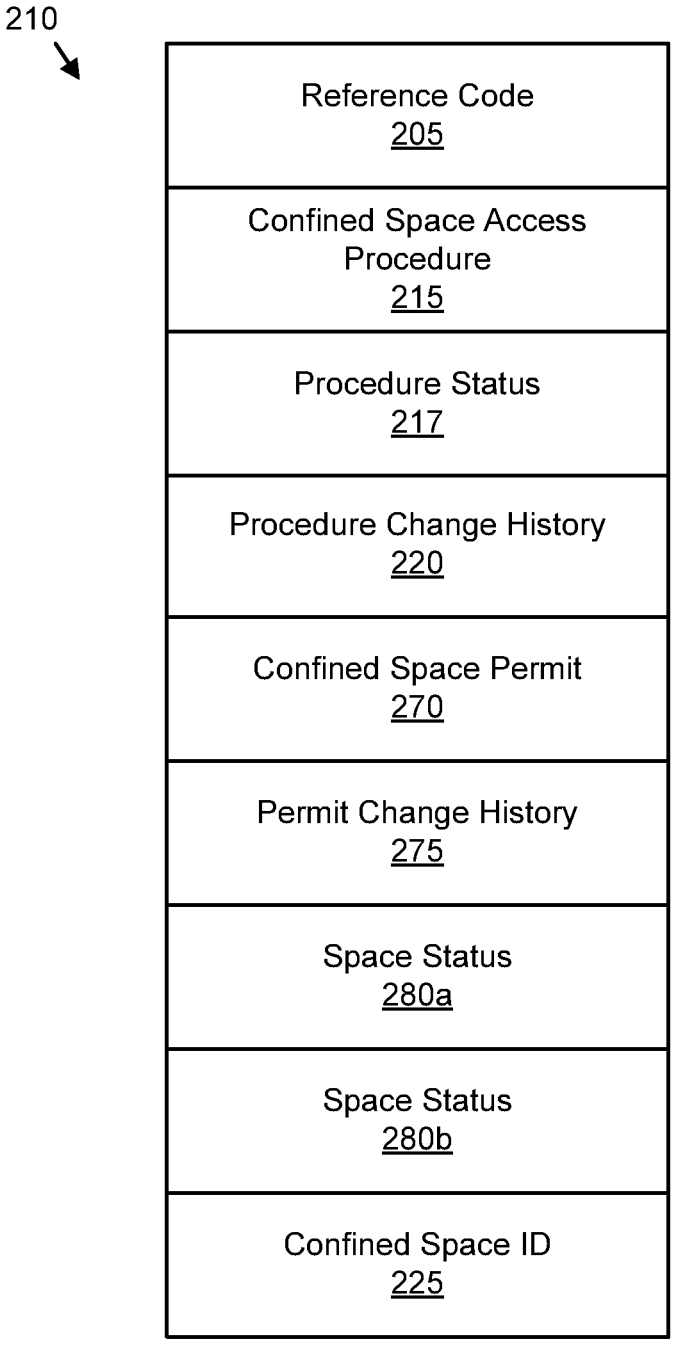
210
Reference Code
205
Confined Space Access Procedure
215
Procedure Status
217
Procedure Change History
220
Confined Space Permit
270
Permit Change History
275
Space Status
280a
Space Status
280b
Confined Space ID
225

FIG. 2B

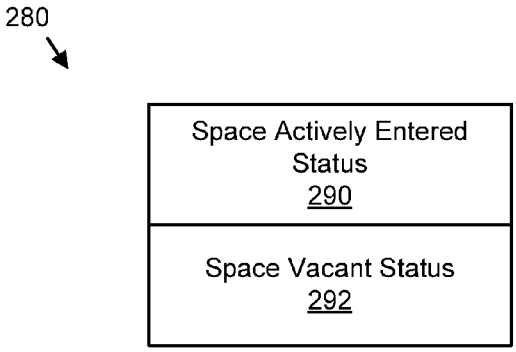
280
Space Actively Entered Status
290
Space Vacant Status
292

FIG. 2C

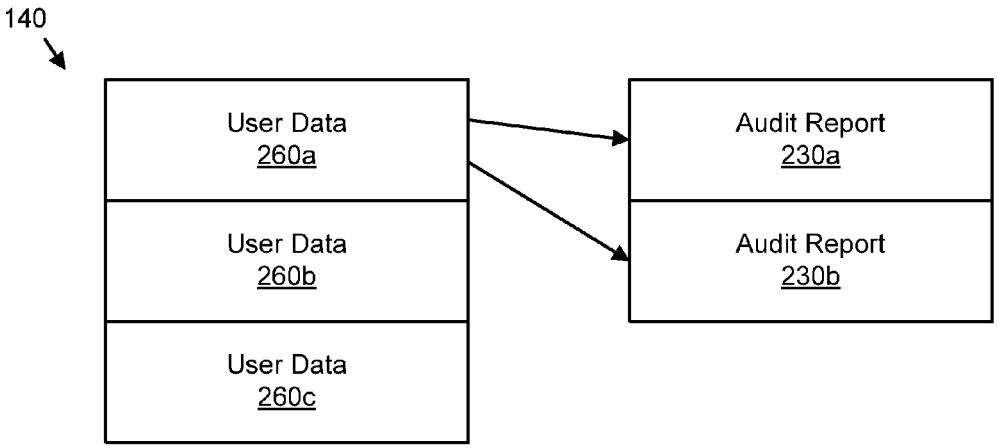
140
User Data
260a
User Data
260b
User Data
260c
Audit Report
230a
Audit Report
230b

FIG. 2D

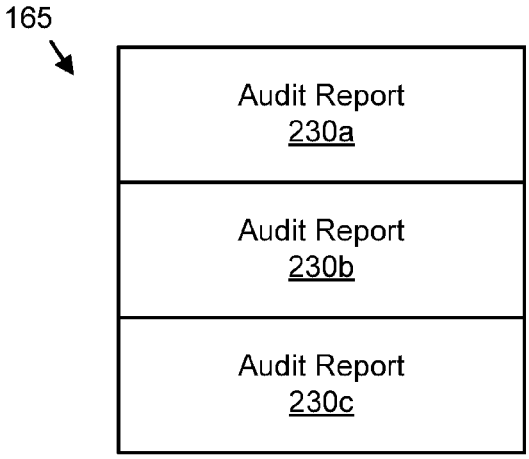

FIG. 2E

230

Auditor Data 232	Attestation 240
Audit Time 234	Audit Status 242
Audit Result 236	Reference Code 205
User ID 238	Confined Space ID 225

FIG. 2F

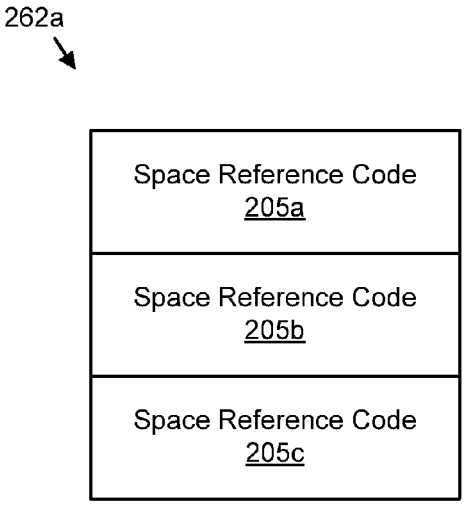

FIG. 2G

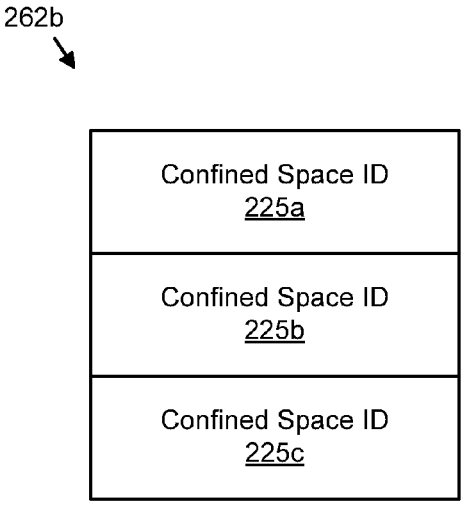

FIG. 2H

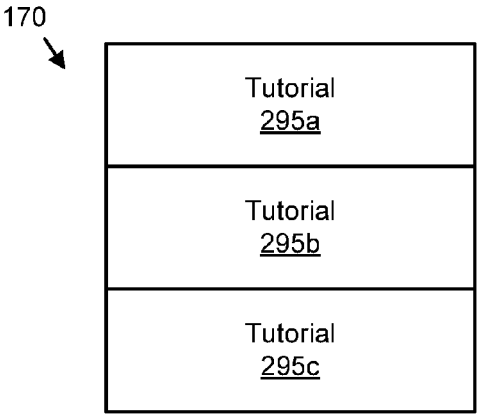

FIG. 2I

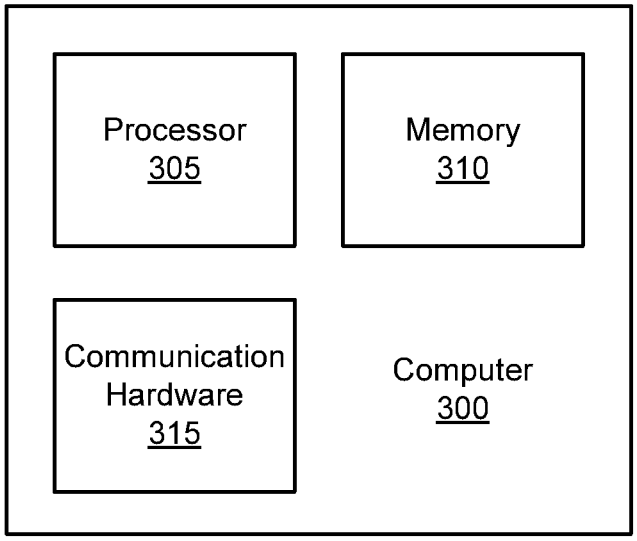
Processor
305
Memory
310
Communication
Hardware
315
Computer
300

FIG. 3A

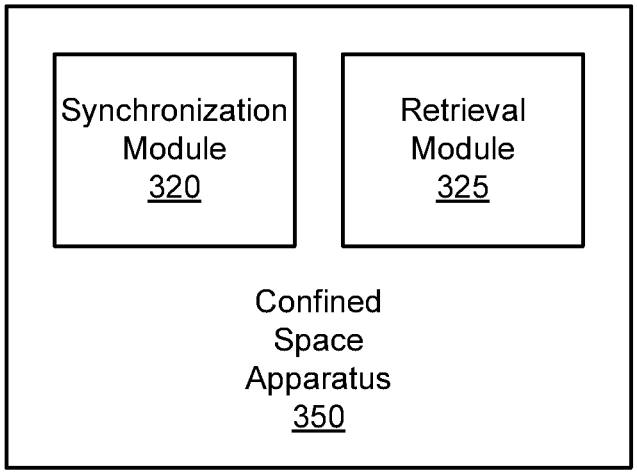
Synchronization
Module
320
Retrieval
Module
325
Confined
Space
Apparatus
350

FIG. 3B

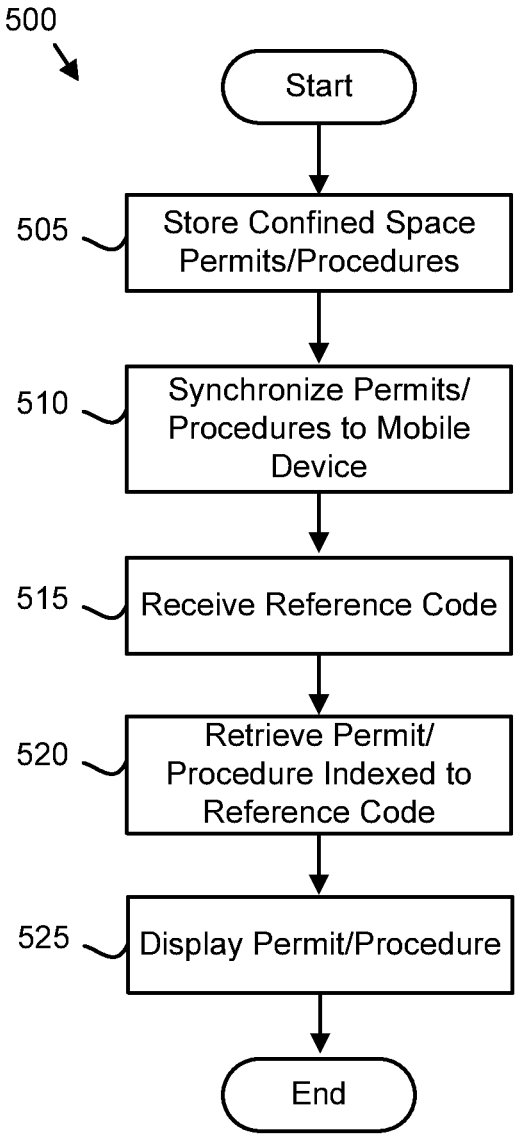
500
Start
505
Store Confined Space Permits/Procedures
510
Synchronize Permits/ Procedures to Mobile Device
515
Receive Reference Code
520
Retrieve Permit/ Procedure Indexed to Reference Code
525
Display Permit/Procedure
End

FIG. 4A

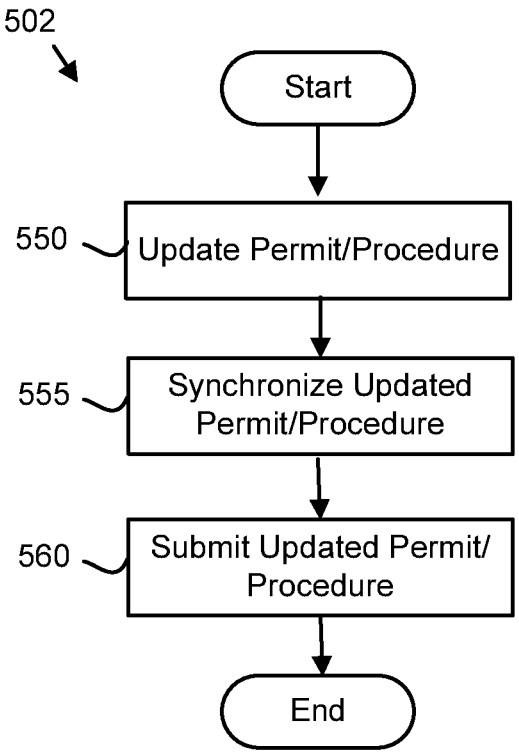
502
Start
550
Update Permit/Procedure
555
Synchronize Updated Permit/Procedure
560
Submit Updated Permit/ Procedure
End

FIG. 4B

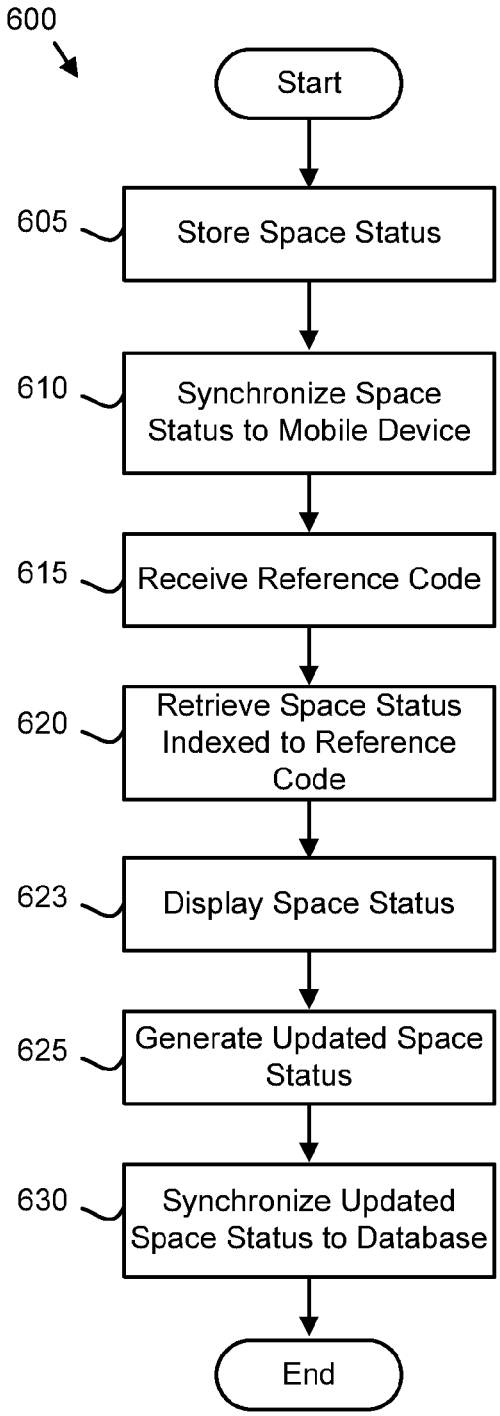
600
Start
605
Store Space Status
610
Synchronize Space Status to Mobile Device
615
Receive Reference Code
620
Retrieve Space Status Indexed to Reference Code
623
Display Space Status
625
Generate Updated Space Status
630
Synchronize Updated Space Status to Database
End

FIG. 4C

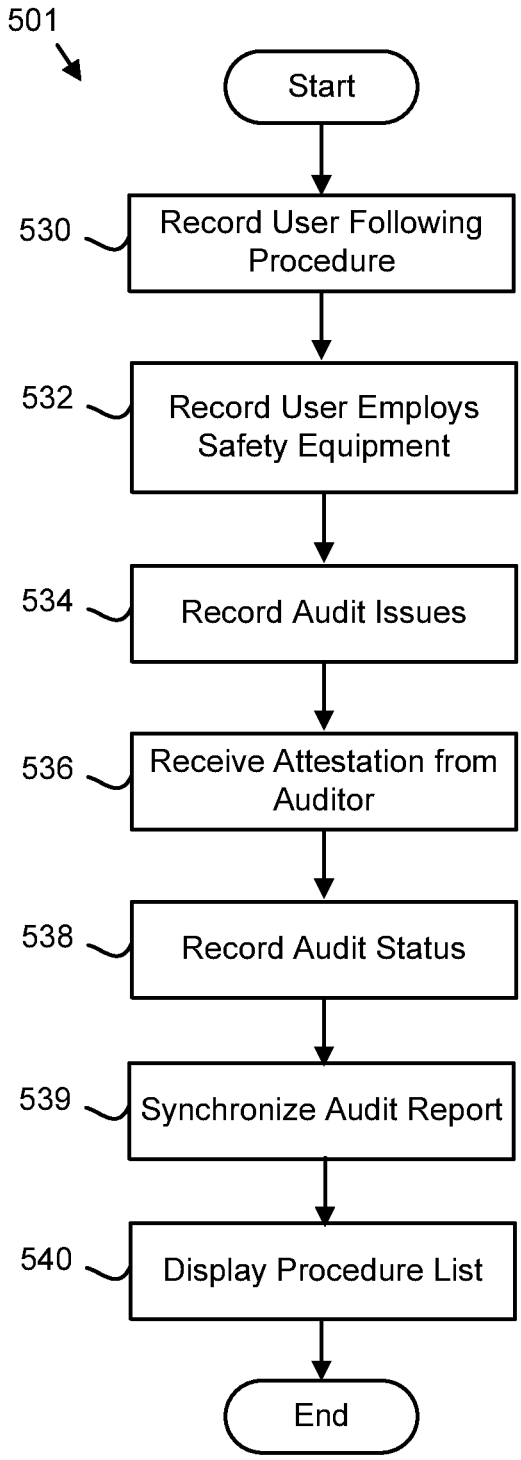
501
Start
530
Record User Following Procedure
532
Record User Employs Safety Equipment
534
Record Audit Issues
536
Receive Attestation from Auditor
538
Record Audit Status
539
Synchronize Audit Report
540
Display Procedure List
End

FIG. 4D

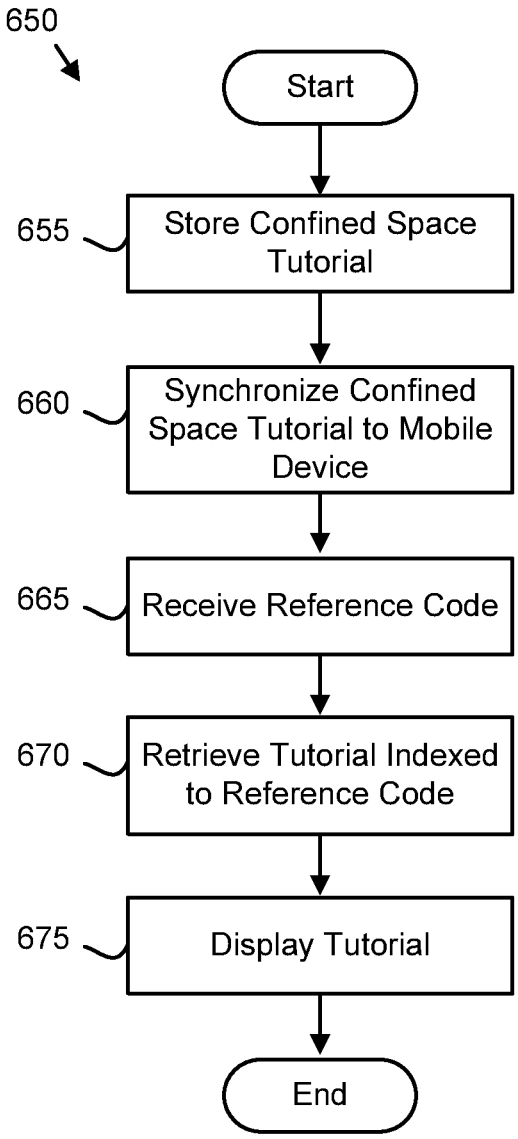
650
Start
655
Store Confined Space Tutorial
660
Synchronize Confined Space Tutorial to Mobile Device
665
Receive Reference Code
670
Retrieve Tutorial Indexed to Reference Code
675
Display Tutorial
End

FIG. 4E

PROVIDING CONFINED SPACE PERMITS AND CONFINED SPACE ACCESS PROCEDURES

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part application of and claims priority to U.S. patent application Ser. No. 13/653,187, now U.S. Pat. No. 8,751,504, entitled "PROVIDING PROCEDURES" and filed on Oct. 16, 2012 for Jimi Michalscheck, which is incorporated herein in its entirety by reference.

FIELD

The subject matter disclosed herein relates to permits and procedures and more particularly relates to providing confined space permits and confined space access procedures.

BACKGROUND

Description of the Related Art

Confined spaces are enclosed areas with limited access that is not organized for continuous occupation and may be dangerous to enter. Confined space permits may be required to enter a confined space. In addition, a confined space access procedure often must be followed to enter the confined space.

BRIEF SUMMARY

A method for providing confined space permits and confined space access procedures is disclosed. A synchronization module stores a plurality of confined space permits and a plurality of confined space access procedures in a confined space database. Each confined space permit and each confined space access procedure corresponds to a confined space of a plurality of confined spaces and each confined space is indexed to a space reference code. The synchronization module synchronizes the plurality of confined space permits and the plurality of confined space access procedures to a mobile device. A retrieval module receives a first space reference code at the mobile device and retrieves a first confined space permit and a first confined space access procedure indexed to the first space reference code. A program product and an apparatus also perform the functions of the method.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the advantages of the embodiments of the invention will be readily understood, a more particular description of the embodiments briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only some embodiments and are not therefore to be considered to be limiting of scope, the embodiments will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

FIG. **1** is a schematic block diagram illustrating one embodiment of a system for providing confined space permits and confined space access procedures;

FIG. **2**A is a schematic block diagram illustrating one embodiment of a confined space database;

FIG. **2**B is a schematic block diagram illustrating one embodiment of confined space data;

FIG. **2**C is a schematic block diagram illustrating one embodiment of a space status;

FIG. **2**D is a schematic block diagram illustrating one embodiment of a user database **140**;

FIG. **2**E is a schematic block diagram illustrating one embodiment of an audit database **165**;

FIG. **2**F is a schematic block diagram illustrating one embodiment of an audit report;

FIG. **2**G is a schematic block diagram illustrating one embodiment of a site list;

FIG. **2**H is a schematic block diagram illustrating one alternate embodiment of the site list;

FIG. **2**I is a schematic block diagram illustrating one embodiment of a tutorial database;

FIG. **3**A is a schematic block diagram illustrating one embodiment of a computer;

FIG. **3**B is a schematic block diagram illustrating one embodiment of a confined space apparatus;

FIG. **4**A is a schematic flow chart diagram illustrating one embodiment of a confined space permit and confined space access procedure provision method;

FIG. **4**B is a schematic flow chart diagram illustrating one embodiment of an update method;

FIG. **4**C is a schematic flow chart diagram illustrating one embodiment of a space status provision method;

FIG. **4**D is a schematic flow chart diagram illustrating one embodiment of an audit method; and

FIG. **4**E is a schematic flow chart diagram illustrating one embodiment of a tutorial provision method.

DETAILED DESCRIPTION

Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment, but mean "one or more but not all embodiments" unless expressly specified otherwise. The terms "including," "comprising," "having," and variations thereof mean "including but not limited to" unless expressly specified otherwise. An enumerated listing of items does not imply that any or all of the items are mutually exclusive and/or mutually inclusive, unless expressly specified otherwise. The terms "a," "an," and "the" also refer to "one or more" unless expressly specified otherwise.

Furthermore, the described features, advantages, and characteristics of the embodiments may be combined in any suitable manner. One skilled in the relevant art will recognize that the embodiments may be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments.

These features and advantages of the embodiments will become more fully apparent from the following description and appended claims, or may be learned by the practice of embodiments as set forth hereinafter. As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method, and/or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein

as a "circuit," "module," or "system." Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more computer readable medium(s) having program code embodied thereon.

Many of the functional units described in this specification have been labeled as modules, in order to more particularly emphasize their implementation independence. For example, a module may be implemented as a hardware circuit comprising custom VLSI circuits or gate arrays, off-the-shelf semiconductors such as logic chips, transistors, or other discrete components. A module may also be implemented in programmable hardware devices such as field programmable gate arrays, programmable array logic, programmable logic devices or the like.

Modules may also be implemented in software for execution by various types of processors. An identified module of program code may, for instance, comprise one or more physical or logical blocks of computer instructions which may, for instance, be organized as an object, procedure, or function. Nevertheless, the executables of an identified module need not be physically located together, but may comprise disparate instructions stored in different locations which, when joined logically together, comprise the module and achieve the stated purpose for the module.

Indeed, a module of program code may be a single instruction, or many instructions, and may even be distributed over several different code segments, among different programs, and across several memory devices. Similarly, operational data may be identified and illustrated herein within modules, and may be embodied in any suitable form and organized within any suitable type of data structure. The operational data may be collected as a single data set, or may be distributed over different locations including over different storage devices, and may exist, at least partially, merely as electronic signals on a system or network. Where a module or portions of a module are implemented in software, the program code may be stored and/or propagated on in one or more computer readable medium(s).

The computer readable medium may be a tangible computer readable storage medium storing the program code. The computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, holographic, micromechanical, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing.

More specific examples of the computer readable storage medium may include but are not limited to a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a portable compact disc read-only memory (CD-ROM), a digital versatile disc (DVD), an optical storage device, a magnetic storage device, a holographic storage medium, a micromechanical storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that can contain, and/or store program code for use by and/or in connection with an instruction execution system, apparatus, or device.

The computer readable medium may also be a computer readable signal medium. A computer readable signal medium may include a propagated data signal with program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electrical, electro-magnetic, magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport program code for use by or in connection with an instruction execution system, apparatus, or device. Program code embodied on a computer readable signal medium may be transmitted using any appropriate medium, including but not limited to wire-line, optical fiber, Radio Frequency (RF), or the like, or any suitable combination of the foregoing

In one embodiment, the computer readable medium may comprise a combination of one or more computer readable storage mediums and one or more computer readable signal mediums. For example, program code may be both propagated as an electro-magnetic signal through a fiber optic cable for execution by a processor and stored on RAM storage device for execution by the processor.

Program code for carrying out operations for aspects of the present invention may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++, PHP or the like and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

The computer program product may be shared, simultaneously serving multiple customers in a flexible, automated fashion. The computer program product may be standardized, requiring little customization and scalable, providing capacity on demand in a pay-as-you-go model.

The computer program product may be stored on a shared file system accessible from one or more servers. The computer program product may be executed via transactions that contain data and server processing requests that use Central Processor Unit (CPU) units on the accessed server. CPU units may be units of time such as minutes, seconds, hours on the central processor of the server. Additionally the accessed server may make requests of other servers that require CPU units. CPU units are an example that represents but one measurement of use. Other measurements of use include but are not limited to network bandwidth, memory usage, storage usage, packet transfers, complete transactions etc.

When multiple customers use the same computer program product via shared execution, transactions are differentiated by the parameters included in the transactions that identify the unique customer and the type of service for that customer. All of the CPU units and other measurements of use that are used for the services for each customer are recorded. When the number of transactions to any one server reaches a number that begins to affect the performance of that server, other servers are accessed to increase the capacity and to share the workload. Likewise when other measurements of use such as network bandwidth, memory usage, storage usage, etc. approach a capacity so as to affect performance, additional network bandwidth, memory usage, storage etc. are added to share the workload.

The measurements of use used for each service and customer are sent to a collecting server that sums the measurements of use for each customer for each service that was processed anywhere in the network of servers that provide the shared execution of the computer program product. The summed measurements of use units are periodically multi-

plied by unit costs and the resulting total computer program product service costs are alternatively sent to the customer and or indicated on a web site accessed by the customer which then remits payment to the service provider.

In one embodiment, the service provider requests payment directly from a customer account at a banking or financial institution. In another embodiment, if the service provider is also a customer of the customer that uses the computer program product, the payment owed to the service provider is reconciled to the payment owed by the service provider to minimize the transfer of payments.

The computer program product may be integrated into a client, server and network environment by providing for the computer program product to coexist with applications, operating systems and network operating systems software and then installing the computer program product on the clients and servers in the environment where the computer program product will function.

In one embodiment software is identified on the clients and servers including the network operating system where the computer program product will be deployed that are required by the computer program product or that work in conjunction with the computer program product. This includes the network operating system that is software that enhances a basic operating system by adding networking features.

In one embodiment, software applications and version numbers are identified and compared to the list of software applications and version numbers that have been tested to work with the computer program product. Those software applications that are missing or that do not match the correct version will be upgraded with the correct version numbers. Program instructions that pass parameters from the computer program product to the software applications will be checked to ensure the parameter lists match the parameter lists required by the computer program product. Conversely parameters passed by the software applications to the computer program product will be checked to ensure the parameters match the parameters required by the computer program product. The client and server operating systems including the network operating systems will be identified and compared to the list of operating systems, version numbers and network software that have been tested to work with the computer program product. Those operating systems, version numbers and network software that do not match the list of tested operating systems and version numbers will be upgraded on the clients and servers to the required level.

In response to determining that the software where the computer program product is to be deployed, is at the correct version level that has been tested to work with the computer program product, the integration is completed by installing the computer program product on the clients and servers.

Furthermore, the described features, structures, or characteristics of the embodiments may be combined in any suitable manner. In the following description, numerous specific details are provided, such as examples of programming, software modules, user selections, network transactions, database queries, database structures, hardware modules, hardware circuits, hardware chips, etc., to provide a thorough understanding of embodiments. One skilled in the relevant art will recognize, however, that embodiments may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of an embodiment.

Aspects of the embodiments are described below with reference to schematic flowchart diagrams and/or schematic block diagrams of methods, apparatuses, systems, and computer program products according to embodiments of the invention. It will be understood that each block of the schematic flowchart diagrams and/or schematic block diagrams, and combinations of blocks in the schematic flowchart diagrams and/or schematic block diagrams, can be implemented by program code. The program code may be provided to a processor of a general purpose computer, special purpose computer, sequencer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the schematic flowchart diagrams and/or schematic block diagrams block or blocks.

The program code may also be stored in a computer readable medium that can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions which implement the function/act specified in the schematic flowchart diagrams and/or schematic block diagrams block or blocks.

The program code may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the program code which executed on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

The schematic flowchart diagrams and/or schematic block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of apparatuses, systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the schematic flowchart diagrams and/or schematic block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions of the program code for implementing the specified logical function(s).

It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the Figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. Other steps and methods may be conceived that are equivalent in function, logic, or effect to one or more blocks, or portions thereof, of the illustrated Figures.

Although various arrow types and line types may be employed in the flowchart and/or block diagrams, they are understood not to limit the scope of the corresponding embodiments. Indeed, some arrows or other connectors may be used to indicate only the logical flow of the depicted embodiment. For instance, an arrow may indicate a waiting or monitoring period of unspecified duration between enumerated steps of the depicted embodiment. It will also be noted that each block of the block diagrams and/or flowchart diagrams, and combinations of blocks in the block diagrams and/or flowchart diagrams, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and program code.

The description of elements in each figure may refer to elements of proceeding figures. Like numbers refer to like elements in all figures, including alternate embodiments of like elements.

FIG. **1** is a schematic block diagram illustrating one embodiment of a system **100** for providing confined space permits procedures. The system **100** provides a confined space permit and/or a confined space access procedure for a confined space **160**. The system **100** includes a server **120**, a confined space database **125**, a user database **140**, an audit database **165**, a tutorial database **170**, a workstation **135**, a network **115**, a mobile device **105**, a plurality of confined spaces **160**, and a space reference code **205** for each confined space **205**. For simplicity, a single confined space **160** and a single space reference code **205** are shown.

The confined space **160** may be an enclosed area. In addition, the confined space **160** may not be organized for continuous and/or regular occupation. In certain embodiments, the confined space **160** may be dangerous to enter. A confined space permit may be required to enter the confined space **160**. The confined space permit may specify the safety equipment, retrieval systems, pipe, line, and/or duct procedures, ventilation protocols, safety measures and the like that must be complied with when entering the confined space **160**.

In addition, a confined space access procedure is often specified for safely entering the confined space **160**. The confined space access procedures may specify in more detail the safety equipment, retrieval systems, pipe, line, and/or duct procedures, ventilation protocols, safety measures and the like that must be complied with when entering the confined space **160**.

Unfortunately, in the past the confined space permits and the confined space access procedures have not always been available when there is a need to access the confined space **160**. For example, when the confined space permits and the confined space access procedures are centrally stored, a user may need to anticipate and acquire the required confined space permits and confined space access procedures before accessing the confined space **160**.

In addition, the user that had earlier acquired the required confined space permits and confined space access procedures may be unaware that a confined space permit and/or a confined space access procedure had been updated. As a result, in the past, users have often lacked the required confined space permits and confined space access procedures or did not have the latest confined space permits and confined space access procedures.

The embodiments described herein provide the most current confined space permits and confined space access procedures to the user. As a result, even when working remotely, the user is assured of having the most current confined space permits and confined space access procedures, allowing the user to conduct safe and compliant access to the confined space **160**.

In order to enhance safety and comply with safety regulations, the availability and proper use of a confined space permit and/or a confined space access procedure for the confined space **160** may be periodically audited. Such an audit may be difficult to track, manage, and report. The embodiments also record if the user follows a confined space permit and/or confined space access procedure to an audit report and synchronizes the audit report to the audit database **165**.

A user may be uncertain as to how to apply confined space access procedures. The embodiments also provide tutorials associated with the confined space **160**. The user may access the tutorials to learn how to properly carry out steps of the confined space access procedures as will be described hereafter.

The space reference code **205** is associated with a unique confined space **160**. The space reference code **205** may be affixed to an entrance of the confined space **160**. Alternatively, the space reference code may be mounted near the entrance to the confined space with **160**. In one embodiment, the space reference code **205** is printed on an adhesive label that is affixed to the confined space **160**. The space reference code **205** may be encoded as a Quick Reference (QR) code. In addition, the space reference code **205** may also be displayed in a human readable form.

In an alternate embodiment, the space reference code **205** is encoded as a barcode. The space reference code **205** may also be encoded as an identification code broadcast via a Radio Frequency Identifier (RFID).

The space reference code **205** refers to confined space permits and confined space access procedures stored in the confined space database **125**. In one embodiment, the space reference code **205** is used as an index to the confined space permits and/or confined space access procedures. The confined space permits and confined space access procedures may be created, edited, updated, and/or deleted from the workstation **135**.

The server **120** may communicate the confined space permits and/or confined space access procedures through the network **115** to the mobile device **105**. The network **115** may be the Internet, a cellular telephone network, a wide area network, a local area network, a wireless network, or combinations thereof.

The server **120** may synchronize all the confined space permits and/or confined space access procedures in the confined space database **125** to the mobile device **105** so that the mobile device **105** stores a copy of all the confined space permits and/or confined space access procedures in the confined space database **125**. Thus all the confined space permits and/or confined space access procedures may be available on the mobile device. In addition, the server **120** may synchronize tutorials from the tutorial database **170** to the mobile device **105**.

In one embodiment, the server **120** maintains a site list of all the confined spaces **160** at a specified site. The site list may include a space reference code **205** for each confined space **160** at the specified site. Alternatively, the site list may include a space identifier for each confined space **160** at the specified site. The server **120** may synchronize only the confined space permits and/or confined space access procedures of a site list to the mobile device **105** in response to receiving a space reference code **205** and/or space identifier for one of the confined spaces **160** on the site list. In one embodiment, the confined space permits and/or confined space access procedures are organized as a database, a data structure, or combinations thereof on the mobile device **105**.

The mobile device **205** may be a tablet computer, a mobile phone, a notebook computer, a personal digital assistant, or the like. The mobile device **105** may receive **145** the space reference code **205**. In one embodiment, the mobile device **105** optically scans a QR code and/or barcode encoding the space reference code **205**. Alternatively, the mobile device **105** may optically scan a barcode encoding the space reference code **205**. In a certain embodiment, the mobile device **105** wirelessly queries an RFID and receives the space reference code **205** encoded in a wireless response from the RFID.

The mobile device **105** may use the space reference code **205** as an index to retrieve the confined space permits and/or confined space access procedures indexed to the space refer-

ence code **205** from the mobile device **105**. The mobile device **105** may display the confined space permit and any information associated with the confined space permit. The mobile device **105** may also display the confined space access procedure, allowing the user to perform the confined space access procedure at the confined space **160**.

If the confined space permits and/or confined space access procedures associated with the space reference code **205** are not stored on the mobile device **105**, the mobile device may use the space reference code **205** to request confined space permits and/or confined space access procedures from the server **120** through the network **115**. The server **120** may synchronize the confined space permits and/or confined space access procedures from the confined space database **125** through the network **115** to the mobile device **105** so that the confined space permits and/or confined space access procedures may be displayed by the mobile device **105**.

By synchronizing the confined space permits and/or confined space access procedures to the mobile device **105**, a user may reference the correct confined space permit for the confined space **160** even if a physical copy of the confined space permit is not available locally. In addition, the user may access the correct confined space access procedure for the confined space **160** on the mobile device **105** even if a paper document with the confined space access procedure has been removed from the confined space **160** or if an incorrect confined space access procedure is placed with the confined space **160**.

FIG. **2**A is a schematic block diagram illustrating one embodiment of a confined space database **125**. The confined space database **125** is the confined space database **125** of FIG. **1**. The confined space database **125** includes confined space data **210** as will be described hereafter. The confined space database **125** may include a plurality of tables, with a plurality of entries in each table. In addition, the confined space data **210** may be associated with one or more audit reports **230**. In one embodiment, the audit reports **230** are stored in the audit database **165** as will be described hereafter.

FIG. **2**B is a schematic block diagram illustrating one embodiment of the confined space data **210**. The confined space data **210** is the confined space data **210** of FIG. **2**A. The confined space data **210** may include a plurality of segments. The segments may be stored in one or more tables. The segments may include the space reference code **205**, a confined space access procedure **215**, a procedure status **217**, a procedure change history **220**, a confined space permit **270**, a permit change history **275**, one or more space statuses **280**, and a confined space identifier **225**. The space reference code **205** may index the confined space data **210**. In addition, the space reference code **205** may identify the confined space **160**.

The confined space access procedure **215** may include instructions in text, hypertext, audio, video, images, and combinations thereof. The confined space access procedure **215** may be displayed and/or transmitted to allow the user to perform one or more operations in the confined space **160**. For example, the confined space access procedure **215** may specify safety equipment, may specify operations for accessing the confined space **160**, may specify operations for maintaining a safe environment within the confined space **160**, and may specify actions to be performed while in the confined space **160**. In a certain embodiment, the confined space access procedure **215** includes a contact link that connects the user to an expert or service personnel. The procedure status **217** may indicate that a space reference code **205** is unassigned, that an audit is passed, failed, and/or that the audit is complete.

The procedure change history **220** may record changes to the confined space access procedure **215**. In one embodiment, changes are recorded to the procedure change history **220** automatically when the changes are made. For example, the user may be prompted to enter a description of the change. Alternatively, the changes may be recorded from comparisons of different versions of the confined space access procedure **215**.

The confined space permit **270** may specify acceptable entry conditions for the confined space **160**, requirements for an attendant stationed outside the confined space **160**, an authorized entrant, closures of pipes, lines, and/or ducts, the breaking of pipes, lines, and/or ducts, the bleeding of pipes, lines, and/or ducts, authorizations for performing hot work, requirements for ventilating and/or making inert the atmosphere of the confined space **160**, requirements for isolating the confined space **160**, required retrieval systems, and test procedures.

The permit change history **275** may record changes to the confined space permit **270**. The changes to the confined space permit **270** may be recorded automatically when the changes are made, such as by prompting for a description of the changes. In one embodiment, the changes to the confined space permit **270** are manually entered from the workstation **135**. In addition, the changes may be determined from a comparison of different versions of the confined space permit **270**.

The space status **280** may record specific status information about the confined space **160**. The space status **280** is described in more detail hereafter in FIG. **2**C. The confined space identifier **225** may include a unique identifier such as architectural drawing reference numbers for one or more confined spaces **160**. The confined space identifier **225** may also be used index the confined space data **210** in the confined space database **125**.

FIG. **2**C is a schematic block diagram illustrating one embodiment of a space status **280**. The space status **280** is the space status **280** of FIG. **2**B. In the depicted embodiment, the space status **280** includes a space actively entered status **290** and the space vacant status **292**. The space actively entered status **290** may indicate that the confined space **160** has been actively entered. The space vacant status **292** may indicate that the confined space **160** is vacant.

FIG. **2**D is a schematic block diagram illustrating one embodiment of a user database **140**. The user database **140** is the user database **140** of FIG. **1**. The user database **140** may be organized as a plurality of tables. The user database **140** includes user data **260**. The user data **260** may include a user name, a user identifier such as employee number, a user image, a biometric identifier, a signature, and the like. In one embodiment, one or more audit reports **230** are associated with the user data **260**.

FIG. **2**E is a schematic block diagram illustrating one embodiment of an audit database **165**. The audit database **165** is the audit database **165** of FIG. **1**. The audit database **165** may store a plurality of audit reports **230** has will be described hereafter in FIG. **2**F.

FIG. **2**F is a schematic block diagram illustrating one embodiment of an audit report **230**. The audit report **230** is the audit report **230** of FIGS. **2**A, **2**D, and **2**E. The audit report **230** may be embodied in one or more tables, a data structure, and the like. The audit report **230** includes auditor data **232**, an audit time **234**, audit results **236**, the user identifier **238**, an attestation **240**, an audit status **242**, the space reference code **205**, and/or the confined space identifier **225**.

The auditor data **232** may identify an auditor performing the audit. In one embodiment, the auditor is identified as the

individual logging into the mobile device **105** to perform the audit. In one embodiment, the auditor may login to the mobile device **105** and select an audit option. An identifier for the auditor may be stored with the auditor data **232**. The audit time **234** may be a timestamp indicating when the audit was completed.

The audit result **236** may describe the results of the audit. The audit results **236** may include a data structure encoding results of the audit, hypertext encoding results of the audit, a written description of results of the audit, a verbal description of results of the audit, and a video description of results of the audit, and combinations thereof. The audit status **242** may summarize the audit such as with a pass/fail indication.

In one embodiment, the user identifier **238** identifies the user performing operations at the confined space **160**. The user identifier **238** may refer to the user data **260**. The space reference code **205** is the space reference code **205** of FIG. **1**. The confined space identifier **225** is the confined space identifier **225** of the confined space **160**.

The mobile device **105** may scan the space reference code **205** to identify the confined space data **210**. The module device **105** may further scan an employee badge of the user to capture the user identifier **238**. The mobile device **105** may also scan the confined space identifier **225** of the confined space **160**.

The auditor may observe the user complying with the requirements of the confined space permit **270**. In addition, the auditor may observe the user performing the confined space access procedure **215** associated with the space reference code **205**. The results of the audit are stored in the audit result **236** as will be described hereafter.

FIGS. **2**G and **2**H are a schematic block diagrams illustrating embodiments of sites lists **260**. In one embodiment, a first site list **260***a* lists the space reference codes **205** of confined spaces **160** at the specified site. Alternatively, a second site list **260***b* lists the space identifiers **225** of confined spaces **160** at the specified site. The site list **260** may be used to determine which confined space permits **270** and/or confined space access procedures **210** are synchronized from the confined space database **125** to the mobile device **105**.

FIG. **2**I is a schematic block diagram illustrating one embodiment of a tutorial database **170**. This tutorial database **170** as its tutorial database **170** of FIG. **1**. The tutorial database **170** stores a plurality of tutorials **295**. Each of the tutorials **295** may include one or more of text instructions, hypertext instructions, audio instructions, video instructions, image instructions, and the like for performing one or more operations. The operations may be specific to a confined space **160**. Alternatively, the operations may be appropriate for multiple similar confined spaces **160**.

FIG. **3**A is a schematic block diagram illustrating one embodiment of the computer **300**. The computer **300** may be the server **120** of FIG. **1**. Alternatively, the computer **300** may be the mobile device **105** and/or the workstation **135** of FIG. **1**. The computer **300** includes a processor **305**, a memory **310**, and communication hardware **315**. The memory **310** may be a computer readable storage medium such as a semiconductor storage device, a hard disk drive, an optical drive, a holographic storage device, a micromechanical storage device, or combinations thereof. The memory **310** may store program code. The processor **305** may execute the program code. The communication hardware **315** may communicate with other devices.

FIG. **3**B is a schematic block diagram illustrating one embodiment of the procedure apparatus **350**. The apparatus **350** may be embodied in the computer **300**. In one embodiment, the apparatus **350** is embodied in the server **120**, the mobile device **105**, or combinations thereof. The apparatus **350** includes a synchronization module **320** and a retrieval module **325**. The synchronization module **320** and the retrieval module **325** may be embodied in a computer readable storage medium such as the memory **310** storing program code that is executed by the processor **305**.

The synchronization module **320** stores a plurality of confined space access procedures **210** and confined space permits **270** in the confined space database **125**. In addition, the synchronization module **320** synchronizes the plurality of confined space access procedures **210** and confined space permits **270** to the mobile device **105**.

The retrieval module **325** may receive the space reference code **205** at the mobile device **105**. In addition, the retrieval module **325** may retrieve the confined space access procedure **215** and confined space permit **270** indexed to the space reference code **205**. Additional functions of the apparatus **350** are described hereafter.

FIG. **4**A is a schematic flow chart diagram illustrating one embodiment of a confined space permit and confined space access procedure provision method **500**. The method **500** may provide a confined space permit **270** and/or a confined space access procedure **215**. The method **500** may perform the functions of the system **100** and apparatus **350**. In one embodiment, the method **500** is performed by a computer readable storage medium such as the memory **310** storing program code. The program code may be executed by the processor **305** to perform the functions of the method **500**.

The method **500** starts, and in one embodiment the synchronization module **320** stores **505** a plurality of confined space access procedures **210** and a plurality of confined space permits **270** in a confined space database **125**. Each confined space access procedure **215** and confined space permit **270** may be indexed with a space reference code **205**. Alternatively, each confined space access procedure **215** and confined space permit **270** may be indexed with a confined space identifier **225**.

The synchronization module **320** may synchronize **510** a confined space access procedure **215** and/or confined space permit **270** from the confined space database **125** to the mobile device **105**. In one embodiment, all confined space access procedures **210** and/or confined space permits **270** are synchronized from the confined space database **125** to the mobile device **105**. In an alternative embodiment, only confined space access procedures **210** and/or confined space permits **270** with space reference codes **205** and/or confined space identifiers **225** of a site list **260** are synchronized **510** to the mobile device **105**. The site list **260** may include at least one space reference code **205** and/or confined space identifier **225** that is received by the mobile device **105**. In one embodiment, the confined space access procedures **210** and/or confined space permits **270** are synchronized when the mobile device **105** is in communication with the network **115**.

The retrieval module **325** receives **515** the space reference code **205**. In one embodiment, the retrieval module **325** embodied in the mobile device **105** and scans a QR code space reference code **205** affixed to the confined space **160**. Alternatively, the retrieval module **325** may receive **515** the space reference code **205** by scanning a barcode, receiving the space reference code **205** wirelessly, and/or by scanning human readable text. The retrieval module **325** may convert the scanned QR code, the scanned barcode, the human readable text, and/or the received space reference code **205** into a digital string.

The retrieval module **325** may retrieve **520** the confined space access procedure **215** and/or confined space permit **270** corresponding to the space reference code **205** that is stored

on the mobile device **105**. In one embodiment, the retrieval module **325** uses the retrieval code **205** is an index to access the confined space access procedure **215** and/or confined space permit **270**. In one embodiment, if the confined space access procedure **215** and/or confined space permit **270** corresponding to the space reference code **205** is not stored on a mobile device **105**, the retrieval module **325** may use the space reference code **205** to request the confined space access procedure **215** and/or confined space permit **270** from the server **120** over the network **115**.

The confined space access procedure **215** and/or confined space permit **270** may be displayed **525** on the mobile device **105** and the method **500** ends. Alternatively, the confined space access procedure **215** and/or confined space permit **270** may be communicated to a second device. In one embodiment, actions taken by the user are recorded to the audit report **230**.

FIG. **4**B is a schematic flowchart diagram illustrating one embodiment of an update method **502**. The method **502** may update a confined space permit **270** and/or a confined space access procedure **215**. The method **502** may perform the functions of the system **100** and apparatus **350**. In one embodiment, the method **502** is performed by a computer readable storage medium such as the memory **310** storing program code. The program code may be executed by the processor **305** to perform the functions of the method **502**.

The method **502** starts, and in one embodiment, the retrieval module **325** updates **550** a confined space access procedure **215** and/or confined space permit **270**. The update may be entered by a user. The synchronization module **320** may synchronize **555** the updated confined space access procedure **215** and/or updated confined space permit **270** to the confined space database **125**. In one embodiment, the updated confined space access procedure **215** and/or updated confined space permit **270** may overwrite a previous confined space access procedure **215** and/or a previous confined space permit **270**. Alternatively, the updated confined space access procedure **215** and/or updated confined space permit **270** may be appended to the confined space database **125**.

In one embodiment, the server **120** may submit **560** the updated confined space access procedure **215** and/or updated confined space permit **270** to a regulatory authority such as the Occupational Safety and Health Administration and the method **502** ends. In one embodiment, the updated confined space access procedure **215** and/or updated confined space permit **270** are submitted as extended markup language files.

FIG. **4**C is a schematic flow chart diagram illustrating one embodiment of a space status provision method **600**. The method **600** may provide and/or update a space status **280**. The method **600** may perform the functions of the system **100** and apparatus **350**. In one embodiment, the method **600** is performed by a computer readable storage medium such as the memory **310** storing program code. The program code may be executed by the processor **305** to perform the functions of the method **600**.

The method **600** starts, and in one embodiment the synchronization module **320** stores **605** a plurality of space statuses **280** in a confined space database **125**. Each space status **280** may be stored as part of confined space data **210**.

The synchronization module **320** may synchronize **610** a space status **280** from the confined space database **125** to the mobile device **105**. In one embodiment, all space statuses **280** are synchronized **610** from the confined space database **125** to the mobile device **105**. In an alternative embodiment, only space statuses **280** corresponding to space reference codes **205** and/or confined space identifiers **225** of a site list **260** are synchronized **610** to the mobile device **105**. In one embodiment, the space statuses **280** are synchronized **610** when the mobile device **105** is in communication with the network **115**.

The retrieval module **325** receives **615** the space reference code **205**. In one embodiment, the retrieval module **325** embodied in the mobile device **105** scans a QR code space reference code **205** affixed to the confined space **160**. Alternatively, the retrieval module **325** may receive **615** the space reference code **205** by scanning a barcode, receiving the space reference code **205** wirelessly, or by scanning human readable text. The retrieval module **325** may convert the scanned QR code, the scanned barcode, the human readable text, and/or the received space reference code **205** into a digital string.

The retrieval module **325** may retrieve **620** the space status **280** corresponding to the space reference code **205** that is stored on the mobile device **105**. In one embodiment, the retrieval module **325** uses the retrieval code **205** is an index to access the space status **280**. If the space status **280** corresponding to the space reference code **205** is not stored on a mobile device **105**, the retrieval module **325** may use the space reference code **205** to request the space status **280** from the server **120** over the network **115**. The space status **280** may be displayed **623** on the mobile device **105**. Alternatively, the space status **280** may be communicated to a second device.

The retrieval module **325** may generate **625** an update of the space status **280**. The user may enter the update on the mobile device **105**. Alternatively, the update may be generated **625** in response to the user indicating that a portion of the confined space access procedure **215** is completed. In one embodiment, the update to the space status **280** may be generated **625** from the audit report **230**.

The synchronization module **320** may synchronize **630** the updated space status **280** to the confined space database **125** and the method **600** ends. In one embodiment, the updated space status **280** overwrites a previous space status **280** in the confined space database **125**. Alternatively, the updated space status **280** is appended to the confined space database **125**.

FIG. **4**D is a schematic flowchart diagram illustrating one embodiment of an audit method **501**. The method **501** may audit performance of a confined space access procedure **215**. The method **501** may perform the functions of the system **100** and apparatus **350**. In one embodiment, the method **501** is performed by a computer readable storage medium such as the memory **310** storing program code. The program code may be executed by the processor **305** to perform the functions of the method **501**.

The method **501** starts, and in one embodiment the retrieval module **325** records **530** a user following and/or performing a confined space access procedure **215**. The retrieval module **325** may record **530** the following of the confined space access procedure **215** to the audit result **236** of an audit report **230**. The retrieval module **325** may further record **530** the individual performing the audit to the auditor data **232**.

In one embodiment, the retrieval module **325** records **532** if the user employs safety equipment specified by the confined space access procedure **215** and/or confined space permit **270** to the audit result **236**. For example, the confined space access procedure **215** may specify the use of safety equipment, retrieval equipment, or the like. The retrieval module **325** may record **532** if the specified safety equipment is used as part of the confined space access procedure **215**.

The retrieval module **325** may record **534** audit issues for the confined space access procedure **215** and/or confined space permit **270** to the audit results **236**. The audit issues may include that the confined space **160** is incorrectly marked, that the confined space **160** lacks the required safety equipment,

that the confined space **160** was improperly ventilated, that the confined space **160** lacks a physical copy of the confined space access procedure **215** and/or confined space permit **270**, that the steps of the confined space access procedure **215** and/or confined space permit **270** were incorrectly followed, that the user was improperly trained, and the like.

In one embodiment, the retrieval module **325** records **536** an attestation from the auditor. The attestation may be an electronic signature, a biometric identifier, the signature image, or combinations thereof. The retrieval module **325** may further record **538** an audit status **242** that may indicate if the confined space access procedure **215**, confined space **160**, user, or combinations thereof passed the audit.

The synchronization module **320** may synchronize **539** the audit report **230** to the audit database **165**. The audit report **230** may be associated with the confined space data **210**. In addition, the synchronization module **320** may associate the audit report **230** to the user database **140** and associate the audit report **230** with the user data **260** of the user.

In one embodiment, the retrieval module **325** displays **540** a procedure list of the plurality of procedures **210** and the method **501** ends. The procedure list may be displayed **540** on the workstation **135** and/or on the mobile device **105**. The procedure list may include a procedure status **217** for a confined space **160** including the confined space data **210**. The procedure status **217** may indicate that a space reference code **205** is unassigned, that an audit is passed, failed, and/or that the audit is complete.

In one embodiment, the retrieval module **325** displays **540** a summary the audit status for all confined spaces **160**. Alternatively, the retrieval module **325** displays **540** a summary of the audit status for all users. The summary of the audit status may be used to show compliance with one or more regulations.

FIG. **4**E is a schematic flow chart diagram illustrating one embodiment of a tutorial provision method **650**. The method **650** may provide tutorials **295** for a confined space access procedure **215** and/or confined space permit **270**. The method **650** may perform the functions of the system **100** and apparatus **350**. In one embodiment, the method **650** is performed by a computer readable storage medium such as the memory **310** storing program code. The program code may be executed by the processor **305** to perform the functions of the method **650**.

The method **650** starts, and in one embodiment the synchronization module **320** stores **655** a plurality of tutorials **295** in the tutorial database **170**. Each tutorial **295** may be indexed with a space reference code **205**. Alternatively, each tutorial **295** may be indexed with a confined space identifier **225**.

The synchronization module **320** may synchronize **660** a confined tutorial **295** from the confined space database **125** to the mobile device **105**. In one embodiment, all tutorials **295** are synchronized from the confined space database **125** to the mobile device **105**. In an alternative embodiment, only tutorial **295** corresponding to space reference codes **205** and/or space identifiers **225** of a site list **260** are synchronized **510** to the mobile device **105**. In one embodiment, the tutorial **295** are synchronized when the mobile device **105** is in communication with the network **115**.

The retrieval module **325** receives **665** the space reference code **205**. In one embodiment, the retrieval module **325** embodied in the mobile device **105** scans a QR code space reference code **205** affixed to the confined space **160**. Alternatively, the retrieval module **325** may receive **665** the space reference code **205** by scanning a barcode, receiving the space reference code **205** wirelessly, or by scanning human readable text. The retrieval module **325** may convert the scanned QR code, the scanned barcode, the human readable text, and/or the received space reference code **205** into a digital string.

The retrieval module **325** may retrieve **670** the tutorial **295** corresponding to the retrieval code **205** that is stored on the mobile device **105**. In one embodiment, the retrieval module **325** uses the retrieval code **205** is an index to access the tutorial **295**. In one embodiment, if the tutorial **295** corresponding to the space reference code **205** is not stored on a mobile device **105**, the retrieval module **325** may use the space reference code **205** to request the tutorial **295** from the server **120** over the network **115**.

The tutorial **295** may be displayed **675** on the mobile device **105** and the method **650** ends. Alternatively, the tutorial **295** may be communicated to a second device. In one embodiment, the review of the tutorial **295** by the user is recorded to the audit report **230**.

The embodiments store confined space permits **270** and confined space access procedures **215** and synchronize the confined space permits **270** and confined space access procedures **215** to the mobile device **105**. The confined space permits **270** and confined space access procedures **215** may then be retrieved using a space reference code **205** so that the latest confined space permits **270** and confined space access procedures **215** are always accessible to users at the confined space **160**.

The embodiments may be practiced in other specific forms. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method for providing procedures comprising:

storing, by use of a processor, a plurality of confined space permits and a plurality of confined space access procedures in a confined space database, wherein each confined space permit and each confined space access procedure corresponds to a confined space of a plurality of confined spaces, a corresponding confined space permit is required to enter each confined space, and each confined space is indexed to a space reference code that uniquely identifies the confined space;

synchronizing the plurality of confined space permits and the plurality of confined space access procedures to a mobile device;

receiving a first space reference code at the mobile device, wherein the first space reference code is affixed to a first confined space;

retrieving a first confined space permit and a first confined space access procedure indexed to the first space reference code;

synchronizing an audit report recording if a user follows the first confined space access procedure from the mobile device to an audit database, wherein the audit report is linked to the first confined space access procedure in a confined space database and to user data for the user in a user database; and

automatically displaying the audit report linked to the first confined space in response to displaying a procedure status for the first confined space access procedure of the plurality of confined space access procedures and displaying an audit report audit status for the user.

2. The method of claim 1, the method further comprising:
updating one or more of the first confined space permit and the first confined space access procedure at the mobile device;
synchronizing the one or more the updated first confined space permit and the first confined space access procedure from the mobile device to the confined space database; and
submitting the one or more the updated first confined space permit and the first confined space access procedure to a regulatory authority.

3. The method of claim 1, the method further comprising:
storing a plurality of space statuses for each confined space of the plurality of confined spaces;
synchronizing the plurality of space statuses to the mobile device;
generating an update to a first space status at the mobile device; and
synchronizing the updated first space status from the mobile device to the confined space database.

4. The method of claim 3, wherein each space status comprises a space actively entered status and a space vacant status.

5. The method of claim 1, the method further comprising:
recording audit issues for the first confined space access procedure to the audit report;
recording an attestation from an auditor to the audit report; and
recording an audit result to the audit report.

6. The method of claim 1, the audit report comprising an auditor, the user, an audit time, an audit status, and the space reference code.

7. The method of claim 1, the method further comprising
storing a plurality of confined space tutorials in a tutorial database;
synchronizing the plurality of confined space tutorials to the mobile device; and
retrieving a first tutorial in response to the first space reference code.

8. The method of claim 1, wherein the first space reference code is encoded as a Quick Response (QR) code.

9. The method of claim 1, wherein the first space reference code is encoded as a barcode.

10. The method of claim 1, wherein the first space reference code is encoded as an identification code of a Radio Frequency Identifier (RFID).

11. The method of claim 1, wherein the confined space permits and the confined space access procedures are grouped by site and the method further comprising presenting the confined space permits and confined space access procedures grouped to a first site in response to the first space reference code corresponding to the first site.

12. The method of claim 1, further comprising maintaining a site list of space reference codes for a specified site and synchronizing only confined space access procedures and confined space permits with space reference codes that match at least one space reference code of the site list.

13. The method of claim 1, wherein the procedure status for each confined space access procedure is selected from space reference code unassigned, audit incomplete, and audit complete.

14. A program product comprising a non-transitory computer readable storage medium that stores program code executable by a processor to perform:
storing a plurality of confined space permits and a plurality of confined space access procedures in a confined space database, wherein each confined space permit and each confined space access procedure corresponds to a confined space of a plurality of confined spaces, a corresponding confined space permit is required to enter each confined space, and each confined space is indexed to a space reference code that uniquely identifies the confined space;
synchronizing the plurality of confined space permits and the plurality of confined space access procedures to a mobile device;
receiving a first space reference code at the mobile device, wherein the first space reference code is affixed to a first confined space;
retrieving a first confined space permit and a first confined space access procedure indexed to the first space reference code;
synchronizing an audit report recording if a user follows the first confined space access procedure from the mobile device to an audit database, wherein the audit report is linked to the first confined space access procedure in a confined space database and to user data for the user in a user database; and
automatically displaying the audit report linked to the first confined space in response to displaying a procedure status for the first confined space access procedure of the plurality of confined space access procedures and displaying an audit report audit status for the user.

15. The program product of claim 14, the method further comprising:
updating one or more of the first confined space permit and the first confined space access procedure at the mobile device;
synchronizing the one or more the updated first confined space permit and the first confined space access procedure from the mobile device to the confined space database; and
submitting the one or more the updated first confined space permit and the first confined space access procedure to a regulatory authority.

16. The program product of claim 14, the method further comprising:
storing a plurality of space statuses for each specified confined space of the plurality of confined spaces;
synchronizing the plurality of space statuses to the mobile device;
generating an update to a first space status at the mobile device; and
synchronizing the updated first space status from the mobile device to the confined space database.

17. An apparatus comprising:
a processor;
a non-transitory computer readable storage medium storing program code executable by the processor, the program code comprising:
a synchronization module that stores a plurality of confined space permits and a plurality of confined space access procedures in a confined space database, wherein each confined space permit and each confined space access procedure corresponds to a confined space of a plurality of confined spaces, a corresponding confined space permit is required to enter each confined space, and each confined space is indexed to a space reference code that uniquely identifies the confined space and synchronizes the plurality of confined space permits and the plurality of confined space access procedures to a mobile device;
a retrieval module that receives a first space reference code at the mobile device, wherein the first space reference code is affixed to a first confined space and retrieves a

first confined space permit and a first confined space access procedure indexed to the first space reference code;

the synchronization module synchronizing an audit report recording if a user follows the first confined space access procedure from the mobile device to an audit database, wherein the audit report is linked to the first confined space access procedure in a confined space database and to user data for the user in a user database; and

the retrieval module automatically displaying the audit report linked to the first confined space in response to displaying a procedure status for the first confined space access procedure of the plurality of confined space access procedures and displaying an audit report audit status for the user.

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